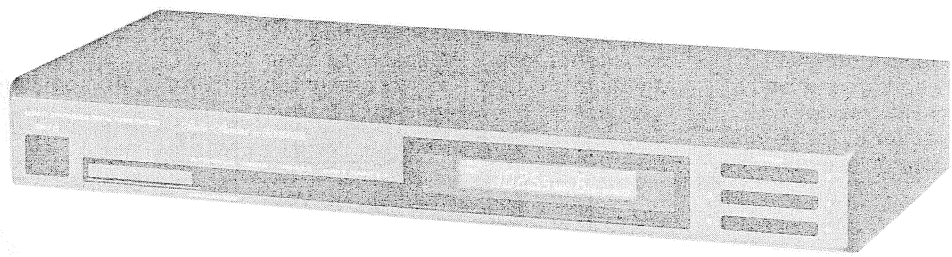
SERVICE MANUAL

FISHER

LW/MW/FM STEREO SYNTHESIZER TUNER

FM-520

(EUROPE/SPAIN)



125 974 40

SPECIFICATIONS

FM SECTION

Usable Sensitivity
- Mono ..... 1.0 µV

46 dB Quieting Sensitivity
- Mono ..... 4.0 µV

Signal-to-Noise Ratio
- Mono ..... 70 dB
- Stereo ..... 63 dB

Capture Ratio ..... 1.5 dB
Alt. Channel Selectivity (±300 kHz) ..... 58 dB
Image Response Ratio ..... 93 dB
Spurious Response Ratio ..... 96 dB
IF Response Ratio ..... > 100 dB
AM Suppression Ratio ..... 65 dB

Total Harmonic Distortion at 60 dBf
- Mono (1kHz) ..... 0.15 %
- Stereo (1kHz) ..... 0.15 %

Stereo Separation
- (100 Hz/1 kHz/10 kHz) ..... 40/40/30 dB

Sub-Carrier Rejection (19 kHz/38 kHz) ..... 35/45 dB

Audio Frequency Response
- (20 Hz - 15 kHz) ..... ±0.1/−2.5 dB

MW SECTION

Usable Sensitivity ..... 550 µV/m
Selectivity (±9 kHz) ..... 40 dB
Signal-to-Noise Ratio ..... 55 dB
Image Response Ratio ..... 40 dB
IF Response Ratio ..... 70 dB

LW SECTION

Usable Sensitivity ..... 1800 µV/m
Selectivity (±9 kHz) ..... 40 dB
Signal-to-Noise Ratio ..... 53 dB
Image Response Ratio ..... 50 dB
IF Response Ratio ..... 70 dB

GENERAL

Power Requirements ..... AC 16V 8W
Dimensions (W x H x D) ..... 400 x 56 x 213 mm
Weight (approx.) ..... 1.7 kg

– Specifications and design are subject to change without notice. –

REFERENCE No. WM-22786

CAUTION ON RF ADJUSTMENT

This model uses a microprocessor for memory preset control for the various bands.
This function has been used to preset frequency points for the different bands to permit adjustment and make it possible to check the function of the microprocessor. To use this supplemental function, ground initialize test point TP7 for 1 second before beginning adjustment. The following table shows the initially preset frequencies.

Band	Memory					
	1	2	3	4	5	6
FM-1	87.5MHz	108MHz	88MHz	98MHz	108MHz	90MHz
MW/LW	603kHz	1404kHz	999kHz	160kHz	350kHz	250kHz

FM TUNER ALIGNMENT

FM ALIGNMENT – FUNCTION switch to FM ST/MUTE position.
Note: It is almost unnecessary to adjust coil in Front End as perfectly adjusted

ITEM	GENERATOR	DIAL SETTING	INDICATOR	PROCEDURE
1. FM IF S-CURVE ALIGNMENT	Connect 10.7MHz Radio IF Generator output to TP1 and ground lead to chassis. Use 5pF capacitor in series with generator output lead.	Position of non-interference Minimum Frequency.	Connect Radio IF Genescope input to TP5 and ground lead to chassis.	Adjust FM DET 1st Coil (T101) and FM DET 2nd Coil (T100) so that S-wave form becomes symmetrical.
2. DETECTOR ADJUSTMENT (MINIMUM T.H.D.)	Connect FM RF signal generator through FM Dummy Antenna to FM Antenna terminals. Set generator output level to 60dBμV at 98MHz±2kHz.	Set Preset STATION button to "4" position. Set to 98MHz.	Connect DC Voltmeter across TP3 and TP4.	Adjust FM DET 1st Coil (T101) until DC Voltmeter reads 0V ±50mV.
			Harmonic Distortion Analyzer to TUNER OUT.	Adjust FM DET 2nd Coil (T100) for minimum gain and best linearity.
Note: Repeat Step 1 (FM DET 1st Coil T101) and 2 (FM DET 2nd Coil T100) until optimum alignment is reached.				
3. FM MUTING LEVEL ADJUSTMENT	Same as above. Adjust attenuator output level for 18dBμV.	Same as above.	Front panel TUNED Display Indicator.	Set MODE Switch to ST/MUTE. Adjust VR100 until the TUNED Indicator partly light up.
Note: Decrease the output level of ATT and confirm that the wave form disappears. Increase the output level of ATT again and confirm that the input level meets the specifications sufficiently when the wave form has appeared.				
4. FM STEREO SIGNAL SEPARATION CONTROL	Connect FM Stereo SG to FM Antenna terminals. 19kHz signal ON. Main channel, sub channel signal ON. Apply 1000Hz signal from LEFT channel.		Connect AC VTVM and Oscilloscope to TUNER OUT.	Adjust VR101 for minimum output.
	Same as above for RIGHT channel.		Connect AC VTVM and Oscilloscope to TUNER OUT.	

Use a screwdriver with plastic grip for all adjustments.

MW/LW Frequency Cover Range
Tuning Voltage Value at TP2

(Table 1)

	153kHz	360kHz	522kHz	1611kHz
Minimum	0.7V	6.0V	1.0V	7.0V
Typical	0.93V	6.7V	1.3V	8.03V
Maximum	1.2V	9.0V	1.4V	9.0V

AM TUNER ALIGNMENT

AM ALIGNMENT – FUNCTION switch to MW or LW position.
Maintain generator output as low as possible for suitable indication.

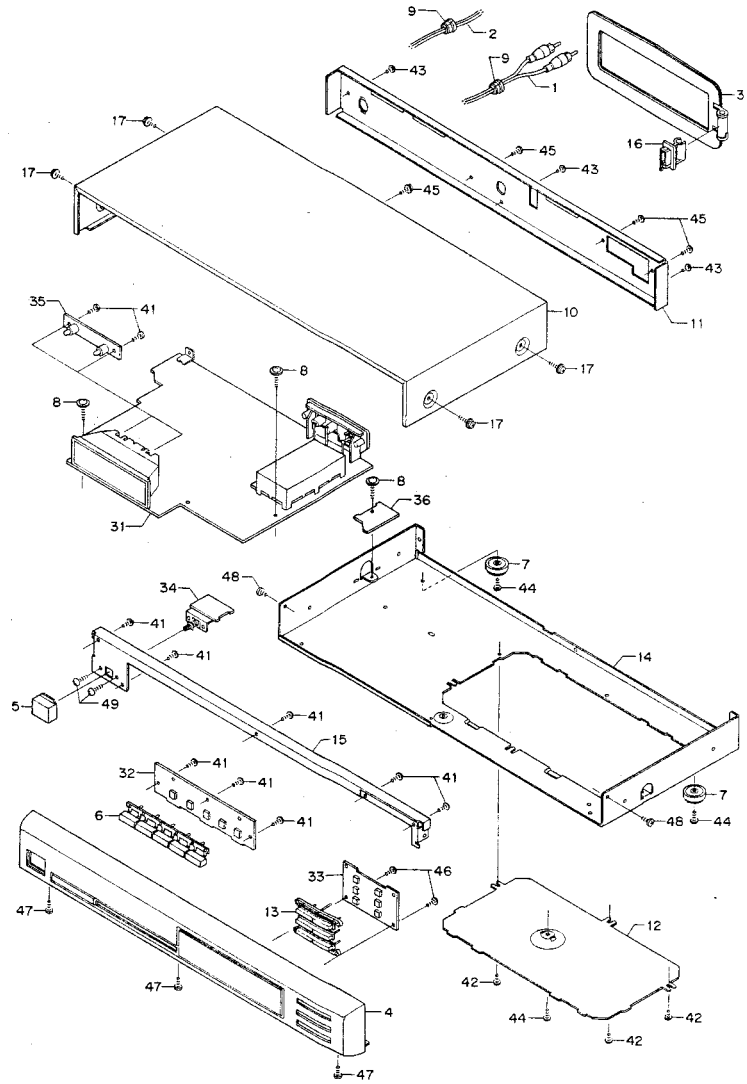
Note: Perform this alignment after FM Tuner Alignment.

ITEM	GENERATOR	DIAL SETTING	INDICATOR	PROCEDURE
1. AM IF ALIGNMENT	Connect 450kHz Radio IF Genescope output to Pin 10 and 11 Adjust output level to 70dBμV.	Position of non-interference Minimum Frequency.	Connect Radio IF Genescope input to TP6 and ground lead to chassis.	Adjust AM IFT (T200) for maximum gain and best symmetry. Keep signal low enough for noise on response.
2. MW RF FREQUENCY COVER ALIGNMENT (1611kHz)	Do not connect generator.	Front Panel DIGITAL Counter Display Set to 1611kHz.	Connect DC Voltmeter to TP2 and ground lead to chassis.	Check DC Voltmeter for Indication 7.0V ~ 9.0V.
3. (522kHz)	Same as above.	DIGITAL Counter Display Set to 522kHz.	Same as above.	Check DC Voltmeter for Indication 1.0V ~ 1.4V.
Note: Repeat the adjustments in items 2 and 3. Then, confirm that each voltage becomes 1.3V to 8.03V at receiving frequency of 522kHz to 1611kHz. **(See Table 1)**				
4. LW RF FREQUENCY COVER ALIGNMENT (360kHz)	Do not connect generator.	Front Panel DIGITAL Counter Display Set to 360kHz.	Connect DC Voltmeter to TP2 and ground lead to chassis.	Check DC Voltmeter for Indication 6.0V ~ 9.0V.
5. (153kHz)	Same as above.	DIGITAL Counter Display Set to 153kHz.	Same as above.	Check DC Voltmeter for Indication 0.7V ~ 1.2V.
Note: Repeat the adjustments in Items 4 and 5. Then, confirm that each voltage becames 0.93V to 6.7V at receiving frequency of 153kHz to 360kHz. **(See Table 1)**				
6. MW RF TRACKING ALIGNMENT (603kHz)	Connect Standard Loop Antenna to output terminal of AM RF Signal Generator. Place Loop Antenna 60cm away from Loop antenna (Unit). Generator Setting to 603kHz or 1404kHz. Modulate with 400Hz (30 % modulation).	Set Preset STATION button to "1" position. Set to 603kHz.	Connect AC VTVM and Oscilloscope to TUNER OUT.	Adjust MW ANT Coil (T201) for maximum gain output.
7. (1404kHz)		Change Preset STATION button to "2" position. Set to 1404kHz.	Same as above.	Adjust MW ANT Trimmer (TC200) for maximum gain output.
Note: Repeat the adjustments in Items 6 and 7. Then, confirm there is no tracking error.				
8. LW RF TRACKING ALIGNMENT (160kHz)	Change generator setting to 160kHz.	Set Preset STATION button to "4" position. Set to 160kHz.	Connect AC VTVM and Oscilloscope to TUNER OUT.	Adjust LW ANT Coil (T202) for maximum gain output.
9. (350kHz)	Change generator setting to 350kHz.	Change Preset STATION button to "5" position. Set to 350kHz.	Same as above.	Adjust LW ANT Trimmer (TC201) for maximum gain output.
Note: Repeat the adjustments in Items 8 and 9. Then, confirm there is no tracking error.				
10. AM AUTO STOP SENSITIVITY ADJUSTMENT	Change generator setting to 999kHz and output level to 60dBμV/m.	Set Preset STATION button to "3" position. Set to 999kHz.	Front Panel TUNED Indicator Display.	Adjust VR200 until the Indicator partly light up.

Use a screwdriver with plastic grip for all adjustments.

CABINET & CHASSIS PARTS LIST/EXPLODED VIEW

Ref. No.	Part No.	Description	Q'ty
PACKAGE			
	620 059 7098	Patching Sheet	1
	620 189 9375	Outer COR.Carton	1
	620 189 9054	Case Styrofoam Left	1
	620 189 9061	Case Styroform Right	1
	620 148 5639	Poly Cover 100 x 190	1
	620 148 8029	Sheet Polyethylene	1
	620 062 0543	Serial No. Sheet	2
ACCESSORIES			
	620 038 1673	FM Antenna Assy	1
	620 057 8783	Bag Fan	1
	620 062 0543	Serial No. Sheet	1
	620 112 8123	Holder Antenna	1
	620 152 2624	Certificate Card	1
	620 190 7759	Explanatory Booklet	1
CABINET			
	620 062 0543	Serial No. Sheet	1
	620 152 7452	Serial No. Sheet	1
1	620 021 7927	Plug Cord RCA	1
2	620 022 1153	Plug Cord Power BK	1
3	620 028 2734	AM Loop Antenna	1
4	620 190 2877	Cabinet Front Assy	1
5	620 046 5366	Knob	1
6	620 046 8336	Knob Function	1
7	620 047 3842	Leg	2
8	620 051 3692	Screw, Braz. Hd. Tapp.-B, +M3.0X6	3
9	620 053 2129	Bushing (4N-4)	2
10	620 088 7366	Cover Top	1
11	620 189 4813	Panel Rear	1
12	620 189 4820	Cover Bottom	1
13	620 190 2976	Knob Tuner Preset	1
14	620 189 4929	Chassis	1
15	620 189 4936	Mount Cabi Front	1
16	620 122 2210	Holder Antenna	1
17	620 122 9738	Screw, Bind Hd. Tapping-B, +M3.0X8	4
31	620 189 9184	Tuner P.C.B. Assy	1
32	620 189 9207	Function Switch P.C.B. Assy	1
33	620 189 9221	Preset Switch P.C.B. Assy	1
34	620 189 9238	Power Switch P.C.B. Assy	1
35	620 189 9245	Lamp P.C.B. Assy	1
36	620 189 9252	EC Terminal P.C.B. Assy	1
41	411 020 5706	SCR S-TPG BRZ 2.6X8	10
42	411 020 7502	SCR S-TPG BRZ 3X5	3
43	411 020 7601	SCR S-TPG BRZ 3X5	3
44	411 020 7700	SCR S-TPG BRZ 3X6	3
45	411 099 9803	SCR S-TPG BRZ 3X8	4
46	411 021 1202	SCR S-TPG BIN 2X8	2
47	411 021 3206	SCR S-TPG BIN 2.6X8	3
48	411 021 5705	SCR S-TPG BIN 3X6	2
49	411 002 8503	SCR PAN 3X6	2



NOTES:

1. Parts order must contain Model Number, Part Number and Description.
2. Ordering quantity of screws and resistors must be multiple of 10 pcs.

P.C.BOARD PARTS LIST

Ref. No.	Part No.	Description	Q'ty
TUNER P.C.B. ASSY			
31	620 189 9184	Tuner P.C.B. Assy	1
	620 182 6180	Frontend FM4EU W/AGC	1

(Component parts used in Front End are not serviceable and available.)

	411 020 7700	SCR S-TPG BRZ 3X6	1
	411 021 2704	SCR S-TPG BIN 2.6X6	2
	620 018 0092	Connector 5P Assy	1
	620 022 2921	ANT Terminal 3P	1
	620 190 3690	LCD 8035 MIJP	1
	620 031 4763	Wire Wrap Terminal	12
	620 050 2450	Metal Mount Antenna	1
	620 053 8848	Plate Heat Sink	1
	620 053 9807	Reflector	1
	620 118 2088	Plate Earth	1
	620 183 1054	Cover Shield Top	1
	620 191 0414	Filter	1
CF100	620 014 6258	Ceramic OSC	1
CF101	620 014 5664	Ceramic Filter	1
CF200	620 014 5862	Ceramic Filter 450kHz	1
CF400	620 007 3226	Crystal 7.2MHz	1
or	620 007 1291	Crystal 7.2MHz	1
or	620 007 1307	Crystal 7.2MHz	1
or	620 007 1314	Crystal 7.2MHz	1
or	620 007 1321	Crystal 7.2MHz	1
F100	620 026 9353	FTZ Antenna Filter	1
F104	620 026 4396	Anti Birdie Filter	1
ICP1	620 017 0734	Protector ICP-5	1
L101	620 026 7915	Chocke Coil 100μH K	1
L102	620 026 7915	Chocke Coil 100μH K	1
L200	620 026 8103	Choke Coil 470μH	1
PC200	620 055 5081	Jumper	1
PC300	620 190 4864	Jumper	1
PC400	620 191 6072	Jumper	1
PC500	620 189 8705	Jumper	1
T100	620 027 7259	IFT, FM DET 2nd	1
T101	620 027 7242	IFT, FM DET 1st	1
T200	620 190 3645	IFT AM	1
or	620 186 0528	IFT AM	1
T201	620 028 1348	MW Antenna Coil	1
T202	620 028 1362	LW Antenna Coil	1
T203	620 190 3676	OSC Coil MW	1
or	620 185 9058	OSC Coil MW	1
or	620 028 7784	OSC Coil MW	1
T204	620 028 7845	OSC Coil LW	1
TC200	620 007 0867	Trimmer 10pF	1
TC201	620 189 9108	Trimmer 20pF	1
VR100	620 006 1933	Potentiometer (B-100kΩ)	1
VR101	620 006 1933	Potentiometer (B-100kΩ)	1
VR200	620 006 1940	Potentiometer (B-10kΩ)	1
IC1	410 014 9607	IC TSE2039AF-020	1
IC2	409 159 8804	IC TC9227P	1
IC3	409 073 9505	IC LA1266	1
IC4	409 017 0803	IC LA3400	1
IC5	409 074 0808	IC LA5667	1
Q100	405 021 0808	TR 2SD1012-H	1
Q101	405 019 2708	TR 2SC536-F-NP	1
or	405 019 3804	TR 2SC536-G-NP	1
Q102	405 004 3901	TR 2SA608-E-NP	1
or	405 004 4502	TR 2SA608-F-NP	1
Q103	405 019 2708	TR 2SC536-F-NP	1
or	405 019 3804	TR 2SC536-G-NP	1
Q104	405 004 4502	TR 2SA608-F-NP	1
or	405 004 5004	TR 2SA608-G-NP	1
Q105	405 019 2708	TR 2SC536-F-NP	1
or	405 019 3804	TR 2SC536-G-NP	1
Q106	405 004 3901	TR 2SA608-E-NP	1
or	405 004 4502	TR 2SA608-F-NP	1
Q107	405 021 0105	TR 2SD1012-F	1
or	405 021 0501	TR 2SD1012-G	1
Q108	405 021 0105	TR 2SD1012-F	1
or	405 021 0501	TR 2SD1012-G	1
Q200	405 027 0505	TR 2SK246-GR	1
Q201	405 021 0808	TR 2SD1012-H	1
Q202	405 019 2708	TR 2SC536-F-NP	1
or	405 019 3804	TR 2SC536-G-NP	1

Ref. No.	Part No.	Description	Q'ty
Q203	405 019 2708	TR 2SC536-F-NP	1
or	405 019 3804	TR 2SC536-G-NP	1
Q204	405 019 2708	TR 2SC536-F-NP	1
or	405 019 3804	TR 2SC536-G-NP	1
Q205	405 004 4502	TR 2SA608-F-NP	1
or	405 004 5004	TR 2SA608-G-NP	1
Q206	405 019 2708	TR 2SC536-F-NP	1
or	405 019 3804	TR 2SC536-G-NP	1
Q400	405 027 0604	TR 2SK246-Y	1
Q401	405 012 1807	TR 2SC1815-BL	1

If necessary, replace both Diode D200, D201 (SVC321) together with new ones which have the equivalent characteristics.

D100	407 005 3805	DIODE DS442-BT				1
D200	407 000 4708	VARACTOR DI SVC321C-2				1
or	407 000 4807	VARACTOR DI SVC321D-2				1
D201	407 000 4708	VARACTOR DI SVC321C-2				1
or	407 000 4807	VARACTOR DI SVC321D-2				1
D202	407 008 0405	DIODE GMB01-BT				1
D203	407 005 3805	DIODE DS442-BT				1
D300	407 004 9105	DIODE DSF10C-BT				1
D301	407 004 9105	DIODE DSF10C-BT				1
D302	407 004 9105	DIODE DSF10C-BT				1
D303	407 004 9105	DIODE DSF10C-BT				1
D400	407 005 3805	DIODE DS442-BT				1
D403	407 005 3805	DIODE DS442-BT				1
D404	407 005 3805	DIODE DS442-BT				1
D407	407 005 3805	DIODE DS442-BT				1
D408	407 005 3805	DIODE DS442-BT				1
D409	407 005 3805	DIODE DS442-BT				1
D410	407 008 0405	DIODE GMB01-BT				1
C100	403 069 0705	CERAMIC	1000P	K	50V	1
C103	403 074 2701	CERAMIC	0.047U	Z	50V	1
C104	403 074 2701	CERAMIC	0.047U	Z	50V	1
C105	403 074 2701	CERAMIC	0.047U	Z	50V	1
C106	403 074 2701	CERAMIC	0.047U	Z	50V	1
C107	403 069 8404	CERAMIC	0.01U	Z	50V	1
C108	403 044 0201	ELECT	47U	M	16V	1
C109	403 069 8404	CERAMIC	0.01U	Z	50V	1
C110	403 049 1609	ELECT	1U	M	50V	1
C111	403 033 9406	CERAMIC	820P	K	50V	1
C112	403 039 2906	ELECT	47U	M	6.3V	1
C113	403 073 8407	CERAMIC	4700P	K	50V	1
C114	403 024 8203	CERAMIC	390P	K	50V	1
C115	403 049 1609	ELECT	1U	M	50V	1
C116	403 069 8404	CERAMIC	0.01U	Z	50V	1
C117	403 042 0302	ELECT	10U	M	16V	1
C118	403 069 8404	CERAMIC	0.01U	Z	50V	1
C119	403 042 0302	ELECT	10U	M	16V	1
C120	403 049 1609	ELECT	1U	M	50V	1
C121	403 048 7602	ELECT	0.47U	M	50V	1
C122	403 050 1209	ELECT	2.2U	M	50V	1
C123	403 069 8404	CERAMIC	0.01U	Z	50V	1
C124	403 074 2701	CERAMIC	0.047U	Z	50V	1
C125	403 069 0705	CERAMIC	1000P	K	50V	1
C126	403 024 8203	CERAMIC	390P	K	50V	1
C127	403 024 8203	CERAMIC	390P	K	50V	1
C128	403 049 1609	ELECT	1U	M	50V	1
C129	403 049 1609	ELECT	1U	M	50V	1
C130	403 073 4003	CERAMIC	3900P	K	50V	1
C131	403 073 4003	CERAMIC	3900P	K	50V	1
C132	403 042 0302	ELECT	10U	M	16V	1
C133	403 038 2303	ELECT	100U	M	6.3V	1
C190	403 069 8404	CERAMIC	0.01U	Z	50V	1
C201	403 026 5408	CERAMIC	47P	K	50V	1
C202	403 074 2701	CERAMIC	0.047U	Z	50V	1
C203	403 074 2701	CERAMIC	0.047U	Z	50V	1
C204	403 074 2701	CERAMIC	0.047U	Z	50V	1
C205	403 069 8404	CERAMIC	0.01U	Z	50V	1
C206	403 031 0306	CERAMIC	68P	K	50V	1
C207	403 016 9003	CERAMIC	20P	J	50V	1
C208	403 088 4104	STYRENE	430P	J	50V	1
C209	403 074 2701	CERAMIC	0.047U	Z	50V	1
C210	403 088 1103	STYRENE	330P	J	50V	1
C211	403 074 2701	CERAMIC	0.047U	Z	50V	1
C212	403 002 2902	CERAMIC	0.01U	M	25V	1
C213	403 069 8404	CERAMIC	0.01U	Z	50V	1

P.C.BOARD PARTS LIST (Continued)

Ref. No.	Part No.	Description				Q'ty
C214	403 047 1502	ELECT	4.7U	M	25V	1
C215	403 050 7706	ELECT	3.3U	M	50V	1
C216	403 047 1502	ELECT	4.7U	M	25V	1
C217	403 061 4206	POLYESTER	0.039U	K	50V	1
C218	403 075 0508	CERAMIC	6800P	K	50V	1
C219	403 042 0302	ELECT	10U	M	16V	1
C220	403 050 1209	ELECT	2.2U	M	50V	1
C221	403 008 5204	CERAMIC	10P	D	50V	1
C222	403 069 8404	CERAMIC	0.01U	Z	50V	1
C224	403 074 2701	CERAMIC	0.047U	Z	50V	1
C250	403 069 8404	CERAMIC	0.01U	Z	50V	1
C251	403 026 5408	CERAMIC	47P	K	50V	1
C252	403 069 8404	CERAMIC	0.01U	Z	50V	1
C255	403 069 8404	CERAMIC	0.01U	Z	50V	1
C300	403 069 8404	CERAMIC	0.01U	Z	50V	1
C301	403 069 8404	CERAMIC	0.01U	Z	50V	1
C302	403 069 8404	CERAMIC	0.01U	Z	50V	1
C303	403 069 8404	CERAMIC	0.01U	Z	50V	1
C304	403 045 2907	ELECT	1000U	M	25V	1
C305	403 042 0302	ELECT	10U	M	16V	1
C306	403 040 2704	ELECT	22U	M	10V	1
C307	403 049 1609	ELECT	1U	M	50V	1
C407	403 001 1906	CERAMIC	0.01U	M	16V	1
C408	403 039 7802	ELECT	100U	M	10V	1
C409	403 040 6603	ELECT	2200U	M	10V	1
C410	403 022 7703	CERAMIC	33P	J	50V	1
C411	403 022 5907	CERAMIC	33P	J	50V	1
C415	403 069 8404	CERAMIC	0.01U	Z	50V	1
C416	403 069 8404	CERAMIC	0.01U	Z	50V	1
C418	403 069 8404	CERAMIC	0.01U	Z	50V	1
C419	403 038 2303	ELECT	100U	M	6.3V	1
C421	403 057 0908	POLYESTER	0.01U	K	50V	1
C422	403 039 2906	ELECT	47U	M	6.3V	1
C423	403 069 1504	CERAMIC	1000P	K	50V	1
C424	403 049 1609	ELECT	1U	M	50V	1
C425	403 044 0201	ELECT	47U	M	16V	1
C426	403 069 8404	CERAMIC	0.01U	Z	50V	1
C427	403 026 5408	CERAMIC	47P	K	50V	1
C500	403 026 8201	CERAMIC	470P	K	50V	1
C700	403 029 0509	CERAMIC	560P	K	50V	1
C701	403 029 0509	CERAMIC	560P	K	50V	1
R1	401 009 6602	CARBON	3.3K	JA	1/2W	1
R100	401 014 2408	CARBON	150	JA	1/4W	1
R101	401 012 4107	CARBON	100	JA	1/4W	1
R102	401 012 7009	CARBON	10K	JA	1/4W	1
R103	401 019 9600	CARBON	47	JA	1/4W	1
R104	401 027 5502	CARBON	6.8K	JA	1/6W	1
R105	401 026 1000	CARBON	2.7K	JA	1/6W	1
R106	401 012 8105	CARBON	100K	JA	1/4W	1
R107	401 027 0309	CARBON	47K	JA	1/6W	1
R108	401 027 5502	CARBON	6.8K	JA	1/6W	1
R109	401 016 4806	CARBON	22K	JA	1/4W	1
R110	401 025 7805	CARBON	2.2K	JA	1/6W	1
R111	401 026 7408	CARBON	39K	JA	1/6W	1
R112	401 023 3700	CARBON	82K	JA	1/4W	1
R113	401 016 4806	CARBON	22K	JA	1/4W	1
R114	401 024 7707	CARBON	100K	JA	1/6W	1
R115	401 027 0309	CARBON	47K	JA	1/6W	1
R116	401 016 1102	CARBON	22	JA	1/4W	1
R117	401 018 3807	CARBON	3.3K	JA	1/4W	1
R118	401 024 7004	CARBON	1K	JA	1/6W	1
R119	401 027 0309	CARBON	47K	JA	1/6W	1
R120	401 024 7707	CARBON	100K	JA	1/6W	1
R121	401 024 7707	CARBON	100K	JA	1/6W	1
R122	401 012 7009	CARBON	10K	JA	1/4W	1
R123	401 026 4308	CARBON	3.3K	JA	1/6W	1
R124	401 016 1102	CARBON	22	JA	1/4W	1
R125	401 024 7400	CARBON	10K	JA	1/6W	1
R126	401 025 0004	CARBON	120K	JA	1/6W	1
R127	401 025 0004	CARBON	120K	JA	1/6W	1
R130	401 016 3809	CARBON	2.2K	JA	1/4W	1
R131	401 016 3809	CARBON	2.2K	JA	1/4W	1
R132	401 024 7707	CARBON	100K	JA	1/6W	1
R133	401 024 7707	CARBON	100K	JA	1/6W	1
R134	401 012 5708	CARBON	1K	JA	1/4W	1
R135	401 012 5708	CARBON	1K	JA	1/4W	1
R136	401 018 3807	CARBON	3.3K	JA	1/4W	1
R137	401 026 4308	CARBON	3.3K	JA	1/6W	1
R138	401 024 6700	CARBON	100	JA	1/6W	1

Ref. No.	Part No.	Description			Q'ty
R139	401 012 8105	CARBON	100K	JA 1/4W	1
R140	401 012 5708	CARBON	1K	JA 1/4W	1
R141	401 012 7009	CARBON	10K	JA 1/4W	1
R201	401 024 7004	CARBON	1K	JA 1/6W	1
R202	401 024 8001	CARBON	1M	JA 1/6W	1
R203	401 026 6609	CARBON	390	JA 1/6W	1
R204	401 026 1000	CARBON	2.7K	JA 1/6W	1
R205	401 012 9300	CARBON	1M	JA 1/4W	1
R206	401 024 7004	CARBON	1K	JA 1/6W	1
R207	401 027 2600	CARBON	5.6K	JA 1/6W	1
R208	401 012 8105	CARBON	100K	JA 1/4W	1
R209	401 012 8105	CARBON	100K	JA 1/4W	1
R211	401 024 7707	CARBON	100K	JA 1/6W	1
R212	401 024 7004	CARBON	1K	JA 1/6W	1
R213	401 026 9907	CARBON	4.7K	JA 1/6W	1
R214	401 025 1902	CARBON	15K	JA 1/6W	1
R215	401 016 4806	CARBON	22K	JA 1/4W	1
R216	401 016 4806	CARBON	22K	JA 1/4W	1
R217	401 027 2600	CARBON	5.6K	JA 1/6W	1
R218	401 012 4503	CARBON	100	JA 1/4W	1
R219	401 026 9907	CARBON	4.7K	JA 1/6W	1
R220	401 018 3807	CARBON	3.3K	JA 1/4W	1
R221	401 016 4806	CARBON	22K	JA 1/4W	1
R222	401 026 9907	CARBON	4.7K	JA 1/6W	1
R223	401 014 4105	CARBON	1.5K	JA 1/4W	1
R224	401 027 0309	CARBON	47K	JA 1/6W	1
R225	401 024 7707	CARBON	100K	JA 1/6W	1
R226	401 018 3807	CARBON	3.3K	JA 1/4W	1
R227	401 026 1000	CARBON	2.7K	JA 1/6W	1
R229	401 025 7805	CARBON	2.2K	JA 1/6W	1
R230	401 024 7707	CARBON	100K	JA 1/6W	1
R240	401 025 7805	CARBON	2.2K	JA 1/6W	1
R241	401 024 7004	CARBON	1K	JA 1/6W	1
R242	401 016 4806	CARBON	22K	JA 1/4W	1
R243	401 016 4806	CARBON	22K	JA 1/4W	1
R301	401 024 7707	CARBON	100K	JA 1/6W	1
R302	401 026 4605	CARBON	33K	JA 1/6W	1
R304	401 024 7400	CARBON	10K	JA 1/6W	1
R400	401 018 3807	CARBON	3.3K	JA 1/4W	1
R401	401 018 3807	CARBON	3.3K	JA 1/4W	1
R402	401 018 3807	CARBON	3.3K	JA 1/4W	1
R403	401 012 7009	CARBON	10K	JA 1/4W	1
R404	401 012 7009	CARBON	10K	JA 1/4W	1
R405	401 012 7009	CARBON	10K	JA 1/4W	1
R406	401 012 7009	CARBON	10K	JA 1/4W	1
R407	401 012 4503	CARBON	100	JA 1/4W	1
R410	401 012 5708	CARBON	1K	JA 1/4W	1
R414	401 012 7009	CARBON	10K	JA 1/4W	1
R418	401 024 7707	CARBON	100K	JA 1/6W	1
R420	401 012 5708	CARBON	1K	JA 1/4W	1
R421	401 012 5708	CARBON	1K	JA 1/4W	1
R422	401 019 9600	CARBON	47	JA 1/4W	1
R423	401 018 4903	CARBON	33K	JA 1/4W	1
R424	401 027 5908	CARBON	68K	JA 1/6W	1
R425	401 024 7400	CARBON	10K	JA 1/6W	1
R426	401 027 2600	CARBON	5.6K	JA 1/6W	1
R428	401 017 1804	CARBON	2.7K	JA 1/4W	1
R429	401 026 1000	CARBON	2.7K	JA 1/6W	1
R430	401 020 0801	CARBON	470	JA 1/4W	1
R431	401 027 5205	CARBON	680	JA 1/6W	1
R432	401 024 7400	CARBON	10K	JA 1/6W	1
R433	401 024 7004	CARBON	1K	JA 1/6W	1
R434	401 024 7400	CARBON	10K	JA 1/6W	1
R435	401 012 5708	CARBON	1K	JA 1/4W	1
R436	401 012 5708	CARBON	1K	JA 1/4W	1
R501	401 024 7400	CARBON	10K	JA 1/6W	1
R502	401 024 7400	CARBON	10K	JA 1/6W	1
R503	401 025 2805	CARBON	150K	JA 1/6W	1
R504	401 025 2805	CARBON	150K	JA 1/6W	1
R505	401 025 2805	CARBON	150K	JA 1/6W	1
R506	401 025 2805	CARBON	150K	JA 1/6W	1
R507	401 014 6109	CARBON	150K	JA 1/4W	1
R508	401 027 5908	CARBON	68K	JA 1/6W	1
R509	401 027 5908	CARBON	68K	JA 1/6W	1
R510	401 022 4104	CARBON	68K	JA 1/4W	1
R511	401 022 4104	CARBON	68K	JA 1/4W	1
R512	401 022 4104	CARBON	68K	JA 1/4W	1
R513	401 026 4308	CARBON	3.3K	JA 1/6W	1
R515	401 024 7707	CARBON	100K	JA 1/6W	1

P.C.BOARD PARTS LIST (Continued)

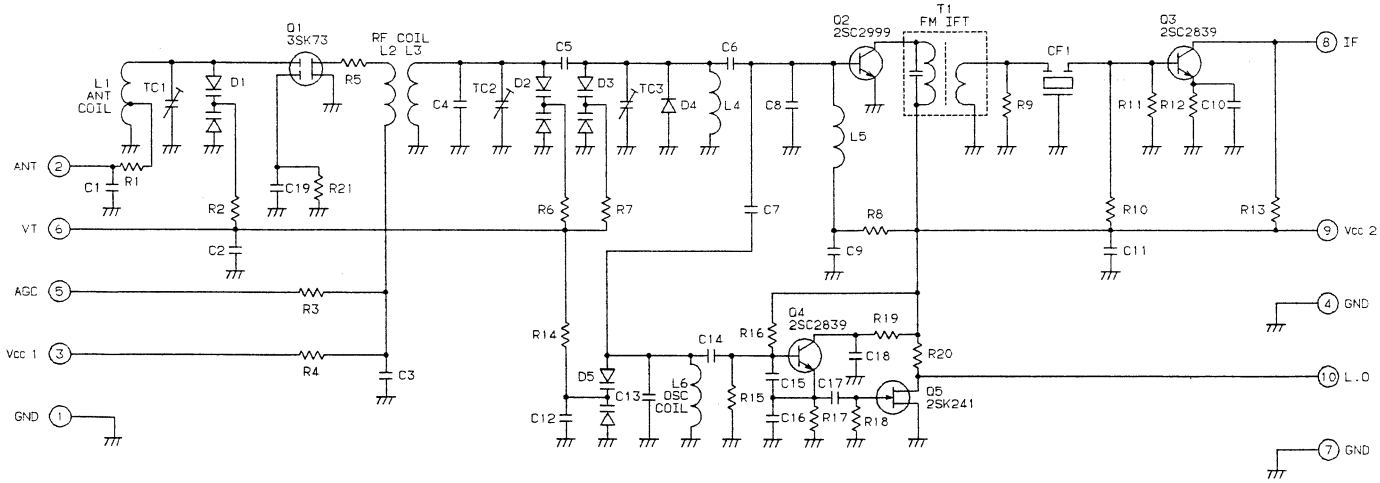
Ref. No.	Part No.	Description	Q'ty
R516	401 024 7707	CARBON 100K JA 1/6W	1
FUNCTION SWITCH P.C.B. ASSY			
32	620 189 9207	Function Switch P.C.B. Assy	1
	620 015 2464	Keyboard Switch	5
or	620 015 2471	Keyboard Switch	5
PRESET SWITCH P.C.B. ASSY			
33	620 189 9221	Preset Switch P.C.B. Assy	1
	620 015 1917	Keyboard Switch 6 mm	6
	620 191 4252	Spacer	2
POWER SWITCH P.C.B. ASSY			
34	620 189 9238	Power Switch P.C.B. Assy	1
SW1	620 016 5815	Switch Push 1 Key	1
or	620 014 9853	Push Switch 1 Key	1
C1	403 069 8404	CERAMIC 0.01U Z 50V	1
C2	403 069 8404	CERAMIC 0.01U Z 50V	1

Ref. No.	Part No.	Description	Q'ty
LAMP P.C.B. ASSY			
35	620 189 9245	Lamp P.C.B. Assy	1
	620 030 8144	Lamp	2
	620 052 0171	Spacer	2
EC TERMINAL P.C.B. ASSY			
36	620 189 9252	EC Terminal P.C.B. Assy	1
	620 031 4763	Wire Wrap Terminal	2
C310	403 069 8404	CERAMIC 0.01U Z 50V	1
C311	403 069 8404	CERAMIC 0.01U Z 50V	1

NOTES:

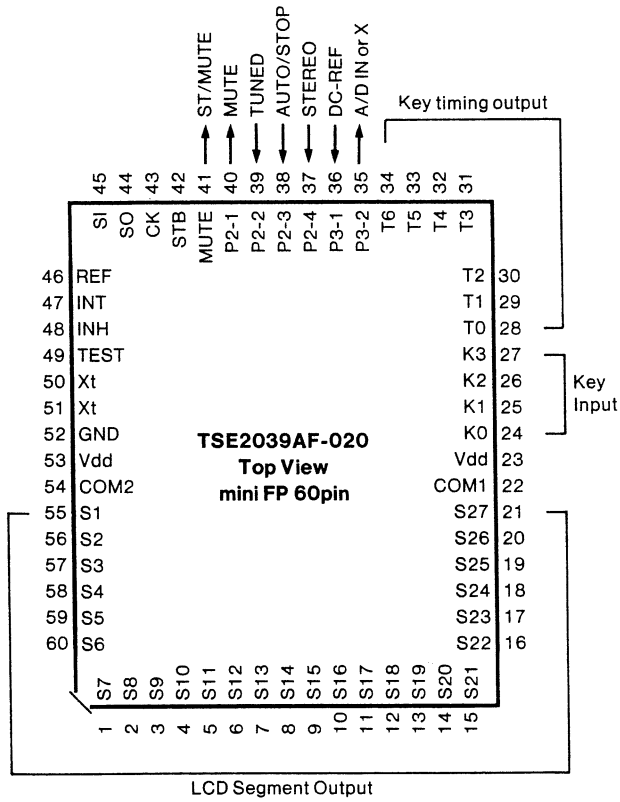
1. Parts order must contain Model Number, Part Number and Description.
2. Ordering quantity of screws and resistors must be multiple of 10 pcs.

FRONT END SCHEMATIC DIAGRAM



CPU PORT DESIGNATIONS (TSE 2039AF-020)

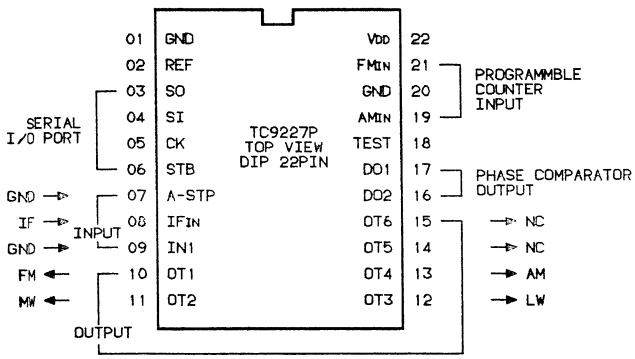
TSE 2039AF-020 OUTLINE



Port	Pin No.	Segment Name		Explanation of Function
		COM1	COM2	
COM1	22	COM1	–	Common 1
S27	21	AM	FM1	AM : MW (2 band) FM1 : FM1 band
S26	20	MW	FM2	MW : MW band FM2 : FM2 band
S25	19	LW	FM3	LW : LW band FM3 : FM3 band
S24	18	AUTO	MANUAL	AUTO : Auto Scan MANUAL : Manual Scan
S23	17	CH	1bc	CH : 6 CH 1bc : 108.00MHz segment
S22	16	[5]	STEREO	[5] : point 5 on level meter STEREO : Stereo In
S21	15	TUNED	MUTING	TUNED : Input On MUTING : Stereo/Mute On
S20	14	2f	2b	2f-a : 108.00MHz segment
S19	13	2e	2g	
S18	12	2d	2c	
S17	11	–	2a	
S16	10	3f	3b	3f-a : 108.00MHz segment
S15	9	3e	3g	
S14	8	3d	3c	
S13	7	FM dot	3a	: 108.00MHz mark
S12	6	4f	4b	4f-a : 108.00MHz segment
S11	5	4e	4g	
S10	4	4d	4c	
S9	3	[1]	4a	[1] : point 1 on level meter (normally ON)
S8	2	5g	5be	5g-f : 108.00MHz segment, 0/5
S7	1	5acdf	[2]	[2] : point 2 on level meter
S6	60	[3]	kHz	[3] : point 3 on level meter kHz : MW/LW unit
S5	59	[4]	MHz	[4] : point 4 on level meter MHz : FM unit
S4	58	7f	7b	75-a: 6 CH segment
S3	57	7e	7g	
S2	56	7d	7c	
S1	55	MEMORY	7a	MEMORY : Store mode
COM2	54	–	COM2	Common 2

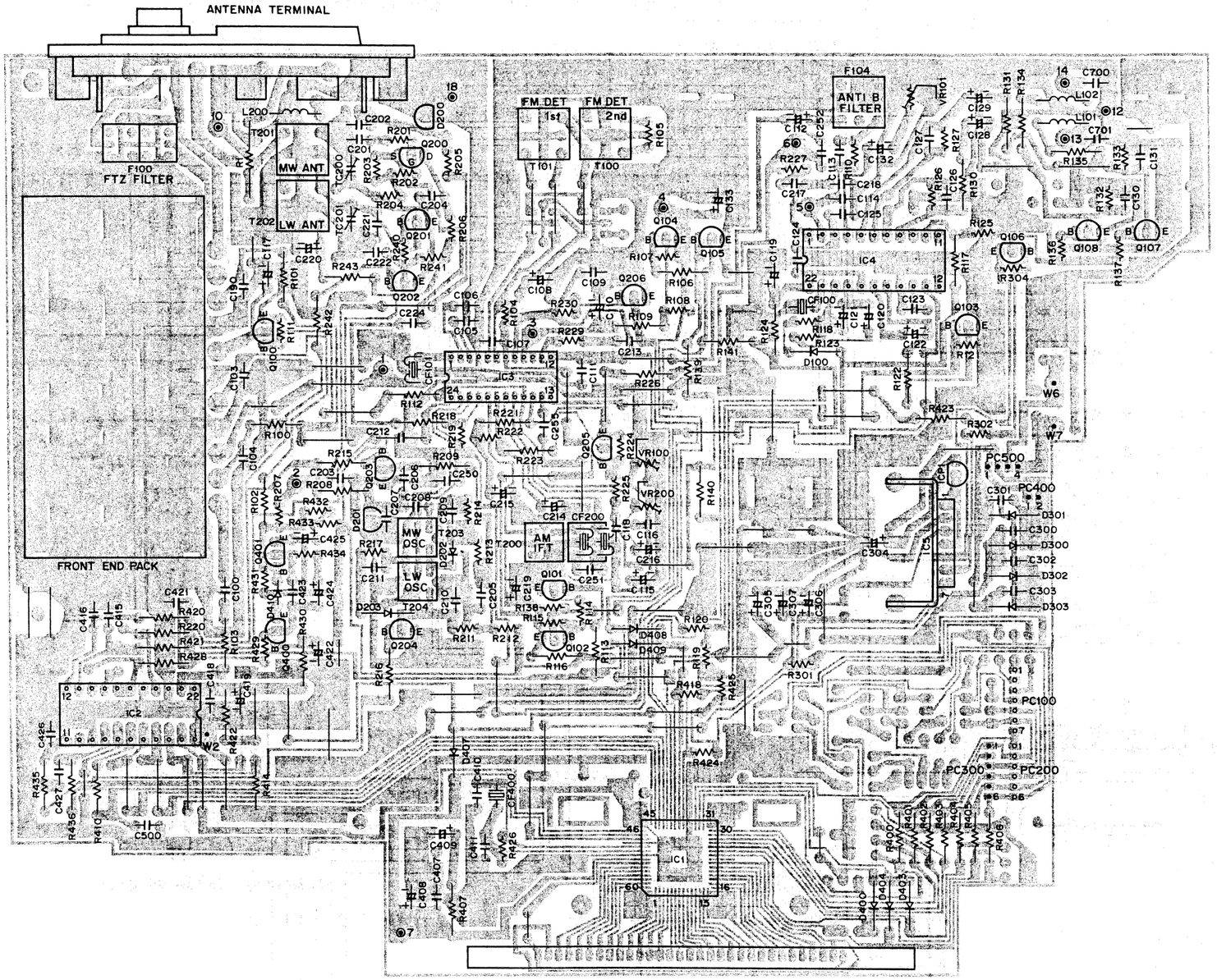
Port	Pin No.	Name	Assignment	Active	Initial
MUTE	41	ST/MUTE	Stereo/Mute Output	L	L
P2-1	40	MUTE	Mute Output	L	H
P2-2	39	TUNED	Tuned Input	L	–
P2-3	38	AUTO/STOP	Auto/Stop Input	L	–
P2-4	37	STEREO	Stereo Ind. Input	L	–
P3-1	36	DC-REF	A/D Ref Input	–	–
P3-2	35	A/D IN	Signal Meter Input	–	–
		or X	Function Output	H	L

TC 9227 OUTLINE

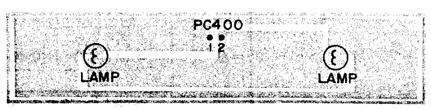


Port	Pin No.	Name	Assignment	Active	Initial
A-Stop	07	GND	Non Use Input	–	L
IF-IN	08	IF-IN	IF Input	–	–
IN1	09	GND	Non Use Input	–	L
OT1	10	FM	Band Output	H	H
OT2	11	MW	Band Output	H	L
OT3	12	LW	Band Output	H	L
OT4	13	AM	Band Output	H	L
OT5	14	NC	Non Use Output	–	L
OT6	15	NC	Non Use Output	–	L

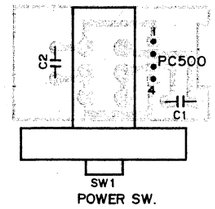
TUNER PRINTED CIRCUIT BOARD
(BOTTOM VIEW)



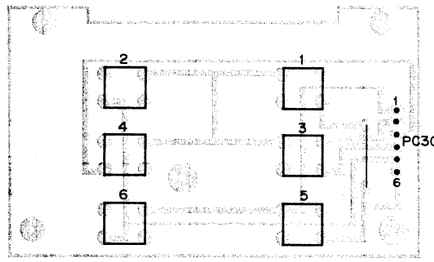
LAMP P.C.BOARD
(BOTTOM VIEW)



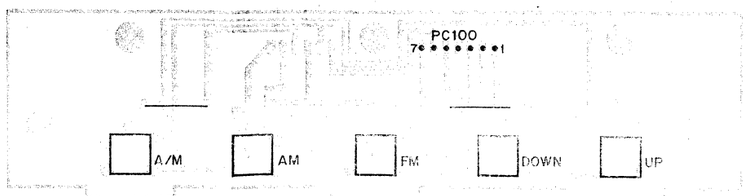
POWER SW. P.C.BOARD
(BOTTOM VIEW)



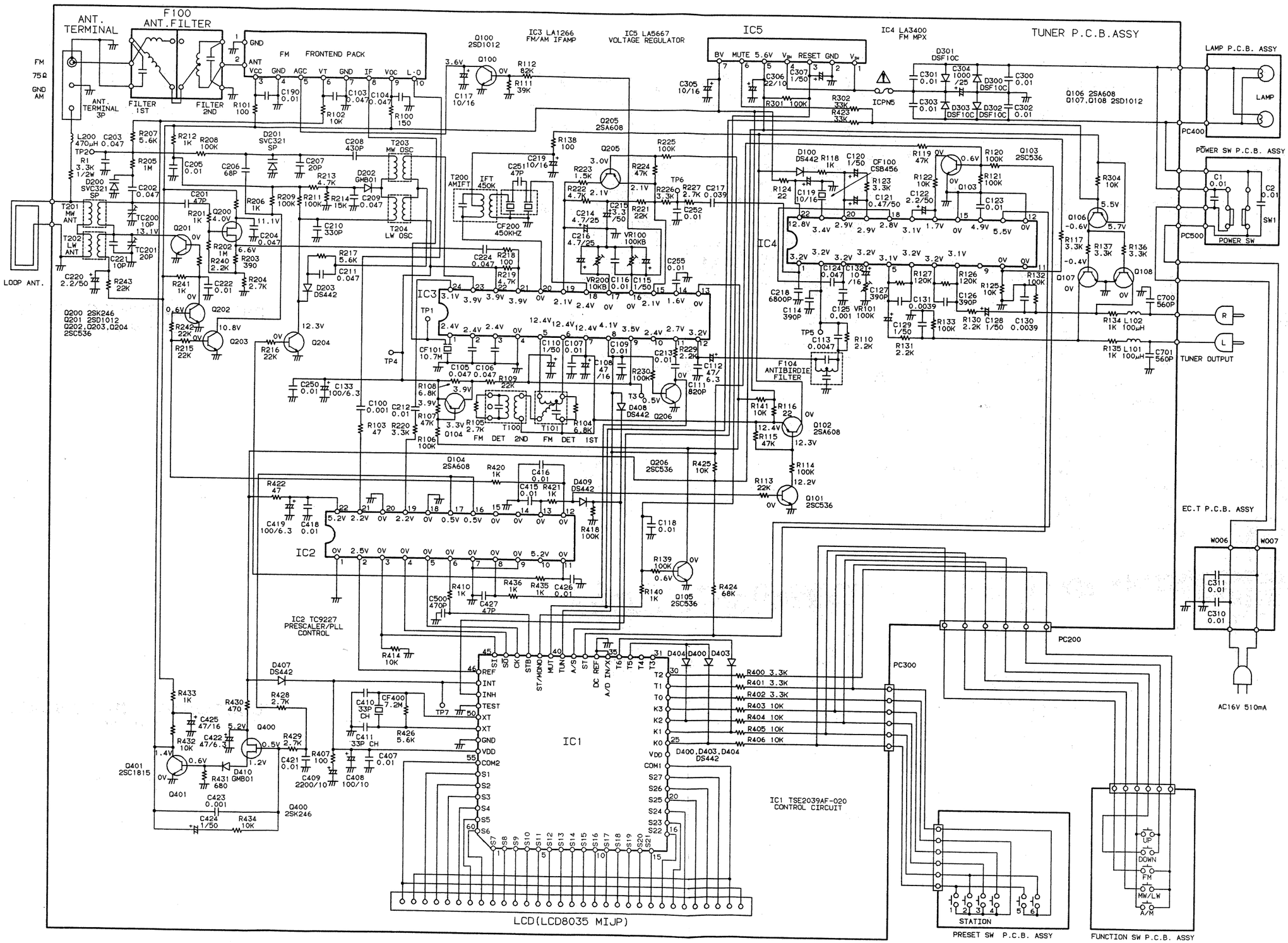
PRESET SWITCH P.C.BOARD
(BOTTOM VIEW)



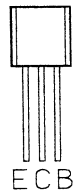
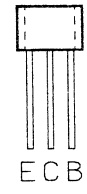
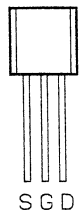
FUNCTION SWITCH P.C.BOARD
(BOTTOM VIEW)



SCHEMATIC DIAGRAM



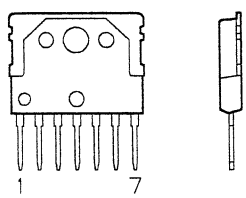
IC & TRANSISTOR LEAD IDENTIFICATION

TRANSISTOR	FRONT VIEW	BOTTOM VIEW	TRANSISTOR	FRONT VIEW	BOTTOM VIEW
2SA608 2SC1815 2SC536			2SD1012		
2SK246					

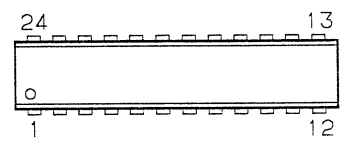
TERMINAL NAME

B → BASE
C → COLLECTOR
E → EMITTER
S → SOURCE
G → GATE
D → DRAIN

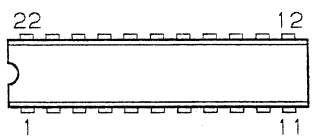
LA5667 FRONT/SIDE VIEWS



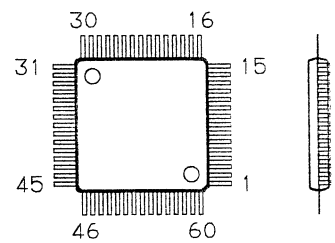
LA1266 TOP VIEW



LA3400 TOP VIEW
TC9227P TOP VIEW

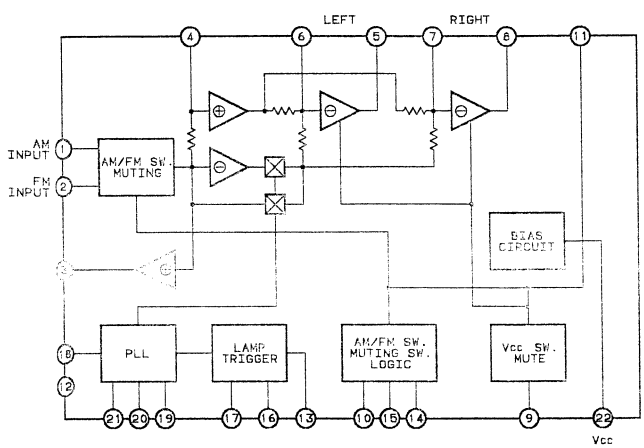


TSE2039AF-020 TOP/SIDE VIEWS



IC BLOCK DIAGRAM

LA3400 BLOCK DIAGRAM



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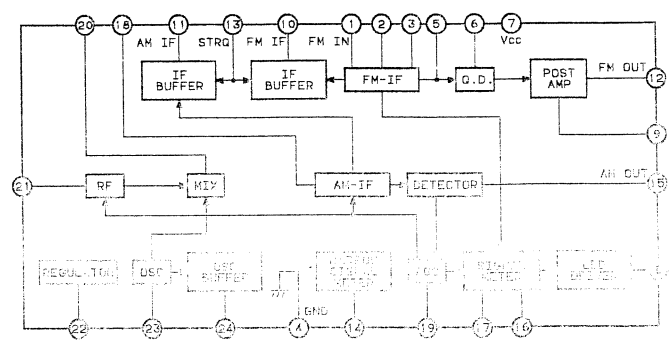

IC BLOCK DIAGRAM (Continued)

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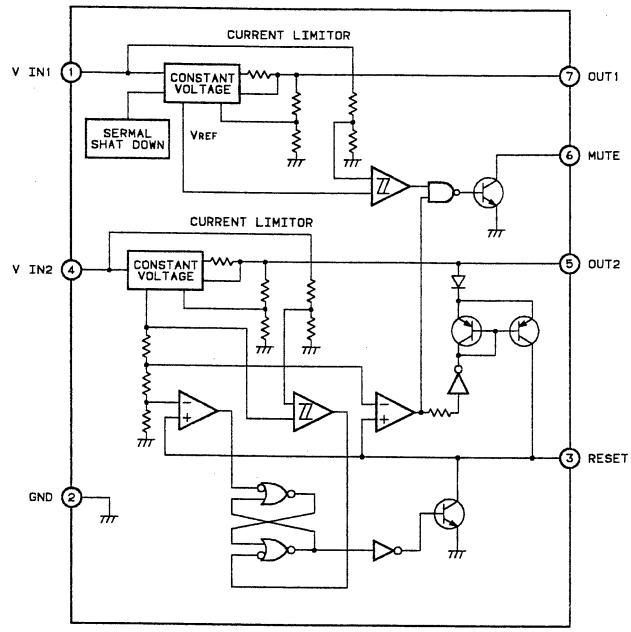
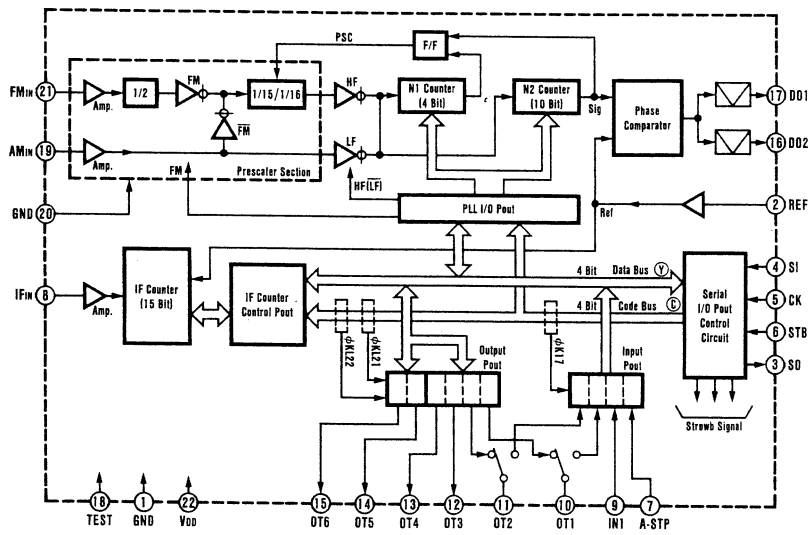


TC9227P BLOCK DIAGRAM



A47500 September/'88/2,500/K **Printed in Japan**

FISHER Hi-Fi Europa Vertriebs GmbH
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